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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/995,802

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Hideyoshi Horie

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7590

08/14/2002

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EXAMINER

CHU, CHRIS C

ART UNIT

PAPER NUMBER

2815

DATE MAILED: 08/14/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/995,802

Applicant(s)

HORIE ET AL. 

Examiner

Chris C. Chu

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1 - 12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 - 12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 November 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## DETAILED ACTION

### *Drawings*

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference characters "11" and "16" have both been used to designate first heat sink. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.
2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the following limitations must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

In claim 6, "a space being provided in the vicinity of the junction of the first heat sink and the second heat sink, into which **an adhesive** used for joining the first heat sink and the second heat sink can flow to thereby prevent the adhesive from reaching the semiconductor light emitting element";

In claim 7, "at least a part of the electrode for the first-conduction-type semiconductor being in contact with the first heat sink, interposed with **a first adhesive**; at least a part of the first heat sink being in contact with the second heat sink, interposed with **a second adhesive**; and **the total weight of the second adhesive is twice or more heavier than the total weight of the first adhesive**"; and

In claim 8, “the total weight of the **second adhesive** being **five times or more heavier than** the total weight of the **first adhesive**”

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

3. Applicant is required to submit a proposed drawing correction in reply to this Office action. However, formal correction of the noted defect may be deferred until after the examiner has considered the proposed drawing correction. Failure to timely submit the proposed drawing correction will result in the abandonment of the application.

#### *Specification*

4. The disclosure is objected to because of the following informalities: needs a detailed description of the Fig. 5.

Appropriate correction is required.

#### *Claim Objections*

5. Claims 1 ~ 12 are objected to because of the following informalities:

In claim 1, line 4, “the first-conduction-type semiconductor” should be --a first-conduction-type semiconductor--.

In claim 1, line 7, "the second-conduction-type semiconductor" should be --a second-conduction-type semiconductor--.

In claim 1, line 12, "the facets" should be --a facets--.

In claim 1, line 12, "the cavity" should be --a cavity--.

Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claim 6 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 6, it cannot be determined what applicant regards as "a space being provided in the vicinity of the junction of the first heat sink and the second heat sink, into which an adhesive used for joining the first heat sink and the second heat sink can flow to thereby prevent the adhesive from reaching the semiconductor light emitting element."

***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 1, 2, 4, 5 and 10 ~ 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hattori in view of Ochiai.

Regarding claim 1, Hattori discloses in Figs. 5 and 10B a semiconductor light emitting device comprising

- at least one semiconductor light emitting element (7) of edge-emission type, a first heat sink (6) and a second heat sink (1),
- at least a part of an electrode (19) for the second-conduction-type semiconductor of the semiconductor light emitting element (7) is in contact with the second heat sink (1).

Hattori does not disclose at least a part of an electrode for the first-conduction-type semiconductor of the semiconductor light emitting element being in contact with the first heat sink, and the first heat sink and the second heat sink being in contact with each other in a junction overlooking one of the two side planes which do not compose the facets of the cavity in the semiconductor light emitting element. However, Ochiai disclose in Fig. 1 at least a part of an electrode for the first-conduction-type semiconductor of the semiconductor light emitting element (1) being in contact with the first heat sink (2a), and the first heat sink (2a) and the second heat sink (2b) being in contact with each other in a junction overlooking one of the two side planes which do not compose the facets of the cavity in the semiconductor light emitting element. Thus, it would have been obvious to one of ordinary skill in the art at the time when the

invention was made to modify Hattori by using the first heat sink as taught by Ochiai. The ordinary artisan would have been motivated to modify Hattori in the manner described above for at least the purpose of providing a high external quantum efficiency (read PURPOSE, lines 1 ~ 3).

Regarding claim 2, Hattori discloses in Figs. 5 and 10B a portion of the electrode (20) for the first-conduction-type semiconductor of the semiconductor light emitting element (7) being not in contact with the first heat sink (6) in the vicinity of the front facet of the element; and a portion of the electrode (19) for the second-conduction-type semiconductor of the semiconductor light emitting element (7) being in contact with the second heat sink (1) in the vicinity of the front facet of the element.

Regarding claim 4, Hattori discloses in Fig. 10B a surface of the second heat sink (1) which is kept in contact with the semiconductor light emitting element (7) having no conductivity with any surface which is not kept in contact with the semiconductor light emitting element.

Regarding claim 5, Hattori discloses in Fig. 10B a lead wire (11) for introducing electric current to the semiconductor light emitting element and which is kept in contact with at least one of the group consisting of semiconductor light emitting element, the first heat sink and the second heat sink; and a pair of portions not connected directly with each other being connected with each other with a plurality of lead wires (11). However, Hattori does not disclose the diameter of a lead wire being 35  $\mu\text{m}$  or less. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the diameter of a lead wire being 35  $\mu\text{m}$  or less, since it has been held that where the general conditions of a claim are disclosed in the prior

art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233. The ordinary artisan would have been motivated to modify Hattori in the manner described above for at least the purpose of decreasing manufacture cost.

Regarding claim 10, Hattori discloses in Fig. 5 and column 7, lines 44 ~ 46 the first-conduction type being p-type, and the second conduction type being n-type.

Regarding claim 11, Hattori discloses in Fig. 10B and column 7, lines 15 ~ 17 the semiconductor light emitting element (7) being a semiconductor laser diode, and the front facet thereof is connected to an optical fiber (5) so as to compose a semiconductor laser module.

Regarding claim 12, Hattori discloses in Fig. 10B the tip of the optical fiber (5) having a light condensation focusing function, and being processed so as to be optically coupled directly with the front facet of the semiconductor laser diode.

10. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hattori and Ochiai as applied to claim 1 above, and further in view of Ishikura.

Regarding claim 3, Hattori and Ochiai disclose the claimed invention except for the surface of the first heat sink which is kept in contact with the semiconductor light emitting element having an effective electro-conductivity with at least one surface which is not kept in contact with the semiconductor light emitting element. However, Ishikura discloses in Fig. 2 the surface of a first heat sink (9) which is kept in contact with the semiconductor light emitting element (7) having an effective electro-conductivity (11) with at least one surface which is not kept in contact with the semiconductor light emitting element. Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to further modify



Hattori by using the effective electro-conductivity as taught by Ishikura. The ordinary artisan would have been motivated to further modify Hattori in the manner described above for at least the purpose of increasing signal transition.

11. Claims 6 ~ 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hattori and Ochiai as applied to claim 1 above, and further in view of Saito.

Regarding claim 6, Hattori and Ochiai disclose the claimed invention except for a space being provided in the vicinity of the junction of the first heat sink and the second heat sink, into which an adhesive used for joining the first heat sink and the second heat sink. However, Saito discloses in Fig. 2 (b) a space being provided in the vicinity of the junction of a first heat sink (13) and a second heat sink (14), into which an adhesive (12) used for joining the first heat sink and the second heat sink. Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to further modify Hattori by using the adhesive as taught by Saito. The ordinary artisan would have been motivated to further modify Hattori in the manner described above for at least the purpose of increasing reliability of the package.

Regarding claim 7, Saito discloses in Fig. 2 (b) at least a part of the electrode for the first-conduction-type semiconductor being in contact with the first heat sink, interposed with a first adhesive; at least a part of the first heat sink being in contact with the second heat sink, interposed with a second adhesive; and the total weight of the second adhesive is twice or more heavier than the total weight of the first adhesive.

Regarding claim 8, Saito discloses in Fig. 2 (b) the total weight of the second adhesive being five times or more heavier than the total weight of the first adhesive.

12. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hattori and Ochiai as applied to claim 1 above, and further in view of Oota.

Regarding claim 9, Hattori and Ochiai disclose the claimed invention except for at least one of the electrodes of the semiconductor light emitting element having an Au layer having a thickness of 30 to 100 nm. However, Oota discloses in column 4, lines 66 ~ column 5, lines 4 at least one of the electrodes of the semiconductor light emitting element has an Au layer having a thickness of 30 to 100 nm. Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to further modify Hattori by using the thickness of gold layer as taught by Oota. The ordinary artisan would have been motivated to further modify Hattori in the manner described above for at least the purpose of protecting the electrode (column 5, lines 15 ~ 18).

### *Conclusion*

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Heberle, Fillion et al., Lam et al., Majumdar et al., Romero et al., Heitzmann et al., Lee et al. and Morton et al. disclose a semiconductor device.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chris C. Chu whose telephone number is (703) 305-6194. The examiner can normally be reached on M-F (10:30 - 7:00).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on (703) 308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7382 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Chris C. Chu  
Examiner  
Art Unit 2815

c.c.  
August 6, 2002

  
**ALLAN R. WILSON**  
**PRIMARY EXAMINER**